

What is claimed is:

1. A lead assembly comprising:
 - a lead body extending from a distal end to a proximal end and including a conductor disposed therein;
 - an electrode assembly including at least one electrode, the electrode assembly electrically coupled with the conductor; and
 - the electrode assembly including at least one electrically conductive tine adapted for fixating the lead assembly within tissue, the at least one electrically conductive tine electrically coupled with the electrode assembly.
2. The lead assembly as recited in claim 1, wherein the at least one electrically conductive tine has a first end coupled with the lead body and a second end which extends away from the lead body.
3. The lead assembly as recited in claim 1, wherein the at least one tine is formed of electrically conductive material.
4. The lead assembly as recited in claim 3, wherein the electrically conductive material comprises a conductive polymer.
5. The lead assembly as recited in claim 3, wherein the electrically conductive material comprises a conductive silicone rubber.
6. The lead assembly as recited in claim 3, wherein the electrically conductive material comprises a conductive thermoplastic elastomer.

7. The lead assembly as recited in claim 1, wherein the at least one conductive tine includes a conductive coating thereon.

8. The lead assembly as recited in claim 1, wherein the at least one conductive tine is molded to the conductor.

9. The lead assembly as recited in claim 1, wherein the lead assembly includes a plurality of conductive tines.

10. The lead assembly as recited in claim 1, wherein the at least one electrically conductive tine comprises a wire extending away from the lead body.

11. The lead assembly as recited in claim 1, wherein the at least one conductive tine comprises a flat wire extending away from the lead body.

12. The lead assembly as recited in claim 1, wherein the at least one conductive tine comprises a foil extending away from the lead body.

13. The lead assembly as recited in claim 1, further comprising at least one non-conductive tine adapted for fixating a portion of the lead assembly.

14. The lead assembly as recited in claim 1, further comprising a defibrillation electrode disposed at the distal end of the lead body.

15. The lead assembly as recited in claim 1, wherein the at least one conductive tine is retractable toward the conductor.

16. A lead assembly comprising:

a lead body extending from a distal end to a proximal end and including a conductor disposed therein;

an electrode assembly including at least one electrode, the electrode assembly electrically coupled with the conductor; and

the at least one electrode including at least one electrically conductive cone adapted for fixating the lead assembly within tissue, the at least one electrically conductive cone electrically coupled with the electrode assembly.

17. The lead assembly as recited in claim 16, wherein the cone includes a conductive ring disposed on a distal end of the cone.

18. The lead assembly as recited in claim 16, wherein the conductive cone is formed of a conductive polymer.

19. A lead assembly comprising:

a lead body extending from a proximal end to a distal end including a conductor disposed therein;

an electrode assembly including at least one electrode electrically coupled with the conductor, the electrode assembly coupled with the lead body;

at least one conductive tine coupled with a portion of the lead body; and

a conductive member disposed within a portion of the at least one tine, the conductive member electrically coupled with the electrode assembly.

20. The lead assembly as recited in claim 19, wherein at least one tine is partially covered with non-conductive material.

21. The lead assembly as recited in claim 19, wherein the at least one tine extends from a first end proximate the lead body to a second end disposed away from the lead body.
22. The lead assembly as recited in claim 19, wherein the lead assembly includes a plurality of conductive tines.
23. The lead assembly as recited in claim 19, wherein the conductive member comprises a wire.
24. The lead assembly as recited in claim 19, wherein the conductive member comprises a flat wire.
25. The lead assembly as recited in claim 19, wherein the conductive member comprises a foil.
26. The lead assembly as recited in claim 19, wherein the at least one tine extends from a first end proximate the lead body to a second end disposed away from the lead body, and a conductive cap is disposed at the second end of the at least one tine.
27. The lead assembly as recited in claim 19, further comprising at least one non-conductive tine adapted for fixating a portion of the lead assembly within tissue.

28. A lead assembly comprising:

 a lead body extending from a proximal end to a distal end defining an intermediate portion therebetween; and
 at least one conductive fixation feature extending away from the lead body at an angle of less than ninety degrees, the at least one conductive fixation feature coupled with the intermediate portion of the lead body and adapted for fixating the lead assembly within a vein, at least one conductive fixation feature including an electrode.

29. The lead assembly as recited in claim 28, wherein the electrode comprises a sensing or pacing electrode.

30. The lead assembly as recited in claim 28, wherein the at least one conductive fixation feature comprises a conductive tine.

31. The lead assembly as recited in claim 28, wherein the at least one conductive fixation feature comprises a wire.

32. The lead assembly as recited in claim 28, wherein the at least one conductive fixation feature comprises a slender projection extending from a first end proximate the lead body to a second end disposed away from the lead body at an angle.

33. The lead assembly as recited in claim 32, further comprising a conductive cap is disposed at the second end of the at least one tine.

34. The lead assembly as recited in claim 28, further comprising at least one non-conductive tine adapted for fixating a portion of the lead assembly within tissue.

35. The lead assembly as recited in claim 28, wherein the at least one conductive fixation feature comprises a cone.

36. A lead assembly comprising:

a lead body extending from a proximal end to a distal end defining an intermediate portion therebetween;

at least one conductor disposed within the lead body and extending from a first end to a second end, the first end proximate to the proximal end of the lead body and the second end proximate to the distal end of the lead body; and

a defibrillation electrode electrically coupled with the conductor, the defibrillation coil disposed at the second end of the conductor forming a defibrillation tip at the distal end of the lead body; at least one electrically conductive tine coupled with a portion of the lead body.

37. The lead assembly as recited in claim 36, further comprising a second defibrillation coil disposed at the intermediate portion of the lead body.

38. The lead assembly as recited in claim 36, wherein the at least one conductive tine has a first end coupled with the lead body and a second end which extends away from the lead body.

39. The lead assembly as recited in claim 36, wherein the at least one tine is partially covered with non-conductive material.

40. The lead assembly as recited in claim 38, further comprising a conductive bead coupled with the second end of the conductive tine.

41. The lead assembly as recited in claim 40, wherein the conductive bead is welded with the conductive tine.

42. The lead assembly as recited in claim 36, wherein the at least one conductive tine is adapted for sensing and/or pacing.

43. The lead assembly as recited in claim 42, wherein the at least one conductive tine is electrically common with the defibrillation electrode.

44. The lead assembly as recited in claim 36, wherein the defibrillation electrode is defined by a first diameter proximate the distal end of the lead body and the conductor is defined by a second diameter proximate to the proximal end of the lead body, and the first diameter is smaller than the second diameter.

45. The lead assembly as recited in claim 36, further comprising an electrical discharge surface between the second defibrillation coil and the distal defibrillation tip.

46. The lead assembly as recited in claim 36, further comprising a defibrillation coil disposed at the intermediate portion of the lead body, an electrical discharge surface between the defibrillation coil and the distal defibrillation tip, and insulation disposed between the at least one conductive tine and the defibrillation coil.

47. A lead assembly comprising:
a lead body extending from a distal end to a proximal end and including a conductor disposed therein;
an electrode assembly including at least one electrode, the electrode assembly electrically coupled with the conductor; and

the at least one electrode assembly including a plurality of electrically conductive tines adapted for fixating the lead assembly within tissue, the plurality of electrically conductive tines electrically coupled with the electrode assembly and adapted to send and receive electrical signals, and the conductive tines are retractable toward the conductor.

48. The lead assembly as recited in claim 47, each of the conductive tines extending from a hinge point to a distal point, the conductive tines adapted to flex at the hinge point.

49. The lead assembly as recited in claim 47, the lead body including a lumen therethrough, the retractable tines disposed within the lumen in a first position.

50. The lead assembly as recited in claim 49, the retractable tines extended out of the lumen in a second position.

51. A lead assembly comprising:
a lead body extending from a distal end to a proximal end and including a conductor disposed therein;
an electrically conductive fitting coupled with the conductor;
an electrode assembly including at least one electrode, the electrode assembly electrically coupled with the fitting; and
the at least one electrode assembly comprising at least one conductive tine molded to the fitting, the at least one tine adapted for fixating the lead assembly within tissue and adapted to send and receive electrical signals.

52. The lead assembly as recited in claim 51, wherein the at least one tine is formed of a conductive polymer.

53. The lead assembly as recited in claim 51, wherein the at least one tine is formed of a conductive thermoplastic elastomer.

54. The lead assembly as recited in claim 51, wherein the at least one tine is formed of a conductive silicone rubber.

55. A lead assembly comprising:

a lead body extending from a distal end to a proximal end and including a conductor disposed therein;

an electrode assembly including at least one electrode, the electrode assembly electrically coupled with the conductor;

the at least one electrode assembly including a conductive fixation feature which is adapted to send and receive electrical signals;

the conductive fixation feature extending from a first end to a second end including a flexible and conductive intermediate portion therebetween, the intermediate portion flexible away from the conductor; and

the first end of the conductive fixation feature attached to the lead body and the second end is movably coupled with the lead body.

56. The lead assembly as recited in claim 55, further comprising a locking mechanism, the locking mechanism adapted to maintain the intermediate portion in a flexed position.

57. The lead assembly as recited in claim 56, the locking mechanism comprising a slider movably disposed within a slot, and an interference slot sized to engage the slider, the slider coupled with the second end of the conductive fixation feature.

58. The lead assembly as recited in claim 55, further comprising a deployment mechanism.

59. The lead assembly as recited in claim 58, wherein the deployment mechanism comprises a wire.

60. A lead assembly comprising:

a lead body extending from a distal end to a proximal end and including a conductor disposed therein;

an electrode assembly including at least one electrode, the electrode assembly electrically coupled with the conductor; and

a sheath of conductive material disposed over the electrode assembly.

61. The lead assembly as recited in claim 60, wherein the electrode assembly comprises a defibrillation coil.

62. The lead assembly as recited in claim 60, wherein the sheath of conductive material is formed of a conductive polymer.

63. The lead assembly as recited in claim 60, wherein the sheath of conductive material is formed of a conductive thermoplastic elastomer.

64. The lead assembly as recited in claim 60, wherein the sheath of conductive material is formed of conductive silicone rubber.

65. A system for delivering signals to the heart, the system comprising:
an electronics system including a cardiac activity sensor and a signal
generator for producing signals to stimulate the heart; and
a lead assembly including:
a lead body extending from a distal end to a proximal end and
including a conductor disposed therein;
an electrode assembly including at least one electrode, the electrode
assembly electrically coupled with the conductor; and
the at least one electrode assembly including at least one electrically
conductive tine adapted for fixating the lead assembly within tissue,
the at least one electrically conductive tine electrically coupled with
the electrode assembly, wherein the at least one tine has a first end
coupled with the lead body and a second end which extends away
from the lead body.

66. The system as recited in claim 65, wherein the at least one tine is formed of a
conductive polymer.

67. The system as recited in claim 65, wherein the at least one tine is formed of a
conductive elastomer.

68. The system as recited in claim 65, wherein the at least one conductive tine
includes a conductive coating thereon.

69. The system as recited in claim 65, wherein the at least one conductive tine
comprises a wire extending away from the lead body.

70. The system as recited in claim 65, wherein the at least one conductive tine extends from a first end proximate the lead body to a second end disposed away from the lead body, and a conductive cap is disposed at the second end of the at least one tine.

71. The system as recited in claim 65, further comprising at least one non-conductive tine adapted for fixating a portion of the lead assembly within tissue.

72. A method comprising:

disposing a defibrillation electrode tip on a distal end of a lead body, the lead body extending from a proximal end to the distal end and having an intermediate portion therebetween;

coupling at least one conductive tine with the intermediate portion of the lead body;

positioning the defibrillation electrode tip within an apex of a heart;

coupling the lead body to a pulse generator; and

delivering defibrillation shocks from the pulse generator via the defibrillation electrode tip.

73. The method as recited in claim 72, further comprising pacing the heart with the at least one conductive tine.

74. The method as recited in claim 72, further comprising sensing the heart with the at least one conductive tine.

75. The method as recited in claim 72, further comprising providing insulation between the defibrillation electrode tip and the at least one conductive tine.

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76. The method as recited in claim 72, further comprising disposing a conductive member on a distal tip of each conductive tine.

77. The method as recited in claim 72, further comprising coupling a conductive member to the at least one conductive tine.

78. A lead comprising:
a lead body extending from a proximal end to a distal end and having an intermediate portion therebetween;
a first defibrillation electrode tip disposed at the distal end of the lead body and adapted to deliver defibrillation shocks at the distal end of the lead body;
a second defibrillation electrode disposed at the intermediate portion of the lead body and adapted to deliver defibrillation shocks at the intermediate portion of the lead body; and
at least one conductive tine disposed at the intermediate portion.

79. The lead as recited in claim 78, wherein the defibrillation electrode tip has a first outer diameter, the second defibrillation electrode has a second outer diameter, and the first outer diameter is less than the second outer diameter.

80. The lead as recited in claim 78, wherein the at least one conductive tine includes a flat wire.

81. The lead as recited in claim 78, wherein the at least one conductive tine includes a foil.

82. The lead as recited in claim 78, wherein the at least one conductive tine includes a conductive element, the lead body includes a coil, and the lead includes a means for coupling the conductive element with the coil.

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